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AUTHOR	Zigler, Edward F.
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ABSTRACT

This follow-up study compares the social adjustment and academic performance of low-income kindergarten and first-grade children who participated in a 9-month Head Start-type nursery school experience with that of kindergarten and first-grade children from the same social background who had not had the nursery school experience. Children were administered the Operation Head Start Behavior Inventory and the Caldwell Preschool Inventory at the beginning and end of their kindergarten year and the Metropolitan Readiness Test, an optional Draw-A-Man test, and the Stanford-Binet in Grade I. School marks in arithmetic and reading at the end of Grade I were used as a measure of adjustment to the school situation and of academic achievement. Results of the first year follow-up indicate that the nursery children started with an advantage in adjustment, and were scored higher by their teachers in industry and initiative, although there was no significant difference in scores on the Caldwell Preschool Inventory. Sex comparisons indicated that although all girls scored higher than all boys in achievement tests, nursery boys and girls did not differ significantly in the amount of gain made over the year. Nursery boys made significantly greater gains than non-nursery boys. In the second year follow-up, findings indicated that the nursery group was rated higher in industry by teachers, that nursery boys obtained higher marks in reading than non-nursery boys, and the nursery group scored higher on the Draw-A-Man test. There were no significant differences between groups on the Metropolitan Readiness Test or the Stanford-Binet, but again, sex differences were evident. Results are summarized and discussed. (SB)

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A STUDY OF CULTURALLY DEPRIVED CHILDREN IN KINDERGARTEN AND GRADE 1 FOLLOWING A NINE-MONTH NURSERY EXPERIENCE

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Final Report

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Edward F. Zigler, Principal Investigator, Professor of Psychology
Willa D. Abelson, Project Director, Research Staff Psychologist
Valerie Klinge, Associate in Research

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Willa D. Abelson
Valerie Klinge
Edward F. Zigler

A STUDY OF CULTURALLY DEPRIVED CHILDREN IN KINDERGARTEN AND GRADE I FOLLOWING A NINE-MONTH NURSERY EXPERIENCE

I. INTRODUCTION

During the past two years a study has been carried out to investigate the consequences of a nine months Headstart-type nursery school experience on the performance of deprived children in public school. The study was initiated to follow-up the nursery school children studied by Zigler and Butterfield (1967) in their investigation of the role of motivation in intelligence test performance. Those authors pointed out that improvement in intelligence test scores of culturally disadvantaged children following a nursery experience has been reported from various centers despite substantial differences in curricula and educational orientation among the nursery school programs involved. It was suggested that these general gains might be due in part, at least, to the impact of the nursery experience on motivational factors affecting the use of intelligence rather than on formal aspects of intellectual functioning such as informational achievements or rate of cognitive development. The positive interpersonal relationships established during any nursery experience would be expected to have an alleviating influence on motivational factors such as wariness of others, fear of punishment, lack of confidence in one's own abilities -- factors which may attenuate test scores by preventing the deprived child from performing as intelligently as his abilities would warrant.

The findings of the Zigler and Butterfield study indicated that, among children enrolled in New Haven Prekindergartens, improved intellectual functioning after the nursery experience was attributable, in fact, to changes in motivational factors. There was no evidence of gains due to changes in formal cognitive processes among these children. This finding is consistent with the goals set out by the original Headstart planners (Ornwake, 1967) and, Zigler and Butterfield point out, the importance of this kind of change should not be minimized, for it demonstrates that culturally deprived children have more intellectual potential than is reflected in their usual test scores. In addition, better performance on a measure such as the Stanford-Binet (which predicts behavioral correlates such as school success better than any other single measure) suggests that there has been improvement in capacity to use intelligence in the kinds of learning problems which are encountered in school. Alleviation of detrimental motivational factors should therefore be regarded as an important component of any program aimed at raising the educational achievements of deprived children to levels commensurate with their abilities.

The follow-up of the children in the Zigler-Butterfield study, which is reported here, is an exploratory investigation. Resources were not available two years ago to conduct a large-scale research project in this area, though a grant from the Office of Economic Opportunity the second year permitted us to gather more complete data. The findings reported below have provided some valuable guidelines for setting up an extensive Prekindergarten follow-up research program in the New Haven Follow-Through Project. This study is now in progress.

Certain aspects of the findings to be reported should be noted at the outset. First, the Ns on two measures administered during the first year (1965-66) of the study are quite curtailed because of S loss through moving

and poor school attendance. The high rate of mobility characteristic of families in disadvantaged areas has been well-documented for the New Haven school population (Levine, et al.,1966). This factor particularly affected data collection during the first year when limited resources did not permit a search for lost Ss to be conducted. An attempt was made to offset the general problem of S loss during the second year (1966-67) by diverting a sizable amount of staff time to locating Ss who had transferred to other New Haven schools and by making repeated attempts to test children who were absentees. In addition, classmates with family background similar to the Nursery group were added to the NonNursery group in order to increase the N of this comparison group to a more acceptable size. Even with these efforts, the original Nursery group N of 40 had dropped to 30 by the end of first grade; the NonNursery group N was 23 in first grade; and a second, younger Nursery group dropped from 19 to 14. (The Zigler-Butterfield study reports on only 12 of these 19 Ss, but we were able to locate 14 for the follow-up.)

It should also be noted that type of classroom experience in Kindergarten and first grade is an uncontrolled variable in this exploratory follow-up study. That the quality of school experience undergone by deprived children following Headstart or Headstart-type nursery is a critical factor in their academic progress has been demonstrated by Wolff and Stein (1966). The 55 Nursery and NonNursery Ss in the present study were enrolled in eleven different first grade classes in three schools.

During the year four first grade children transferred to other schools in New Haven, thus bringing the different school classes represented among the main follow-up groups to 15*. Although the majority of the Nursery and

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* The 14 Nursery-II Ss were enrolled in eight different Kindergarten classes last year. Seven of the 14 children had moved during the one year following nursery school.

NonNursery Ss attended three schools, interclass differences even within a school cannot be overlooked as an important factor in the academic development of these children and this variable is being investigated in the more extensive follow-up study now in progress.

II. METHOD

A. Subjects

Nursery Group (N=32): The Ss in the Nursery group attended two nine-month, four half-days a week, nursery schools serving children from lower socio-economic class homes. Twenty-seven of the Ss attended a nursery which was located in the low-income housing project in which they lived. Occupations of fathers and family income placed these children in the lower-lower socio-economic class. The other five Ss were from upper-lower class homes as determined by father occupation and family income. During the two years of the follow-up study, the Ss were attending the two schools located in their residential areas. Both of these schools have a mixed lower and middle class population. Two of the lower-lower class children moved during first grade to other New Haven schools in low income residential areas. The sex, race and school composition of this group are given in Appendix 1.

NonNursery Group (N=23): In the first year of the follow-up study, when the Ss were in Kindergarten, complete data on two measures administered during that year were obtained on 10 Ss who had not attended a Prekindergarten or day care nursery the year before. Four of these children were from lower-lower socio-economic homes and were classmates of the 27 Nursery Ss described above. The remaining 6 Ss were from lower-lower socio-economic level homes (as determined by father occupation and residence in a lower-

lower income residential area) who were enrolled in Kindergarten in another New Haven school. (Teacher ratings were available on an additional two children and Kindergarten marks were recorded for all 23 NonNursery Ss in the second year follow-up study.)

In the second year all remaining lower socio-economic NonNursery classmates of the 26 Nursery Ss were added to the NonNursery group (6 Ss).* One S on whom data had been incomplete the year before was also included. In addition, 4 classmates of the 5 Nursery Ss in the upper-lower class group who were from similar income-level homes but who had not attended nursery school were assigned to the NonNursery group. The N of the NonNursery group was thereby increased to 23 Ss for the second year's follow-up. Identifying data on these Ss is presented in Appendix 1.

Nursery-II Group (N=14): Fourteen of the NonNursery control Ss in the Zigler-Butterfield study attended nursery school during the first year of the follow-up study. These Ss were included in the follow-up study when they subsequently enrolled in Kindergarten. All 14 Ss were from lower-lower class homes in the housing project in which the majority of the Nursery Ss resided and they attended the nine-month Nursery school serving that project. Seven Ss attended Kindergarten in the neighborhood school the following year. Seven Ss moved to other low income residential areas of New Haven and were enrolled in 4 other New Haven schools. Sex, race and school information on these Ss is presented in Appendix 1.

In the discussion to follow, all references to the Nursery group will refer to the larger Nursery group which was followed up for two years, except where specifically designated as Nursery-II.

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*Spanish speaking children were omitted from the study since their test results would not be valid for comparison with the Nursery group.

B. Measures

1) Operation Headstart Behavior Inventory: The OHBI is a fifty-item rating scale measure of the child's personal-social adjustment to class routine, class work, peers and teachers. The scale incorporates nine dimensions (Sociability-cooperation-politeness; Independence-dependence; Curiosity-enthusiasm-exploration-creativity; Persistence; Emotionality; Self-confidence; Jealousy-attention seeking; Achievement; and Leadership) which yield an overall adjustment score. Each S was rated on the OHBI by his teacher at the beginning and end of the Kindergarten year.

2) Caldwell Preschool Inventory: The Preschool Inventory, an achievement test appropriate for four to six year olds, was constructed by Bettye Caldwell and Donald Soule (1965-66). The Inventory was administered individually to each of the Nursery and NonNursery Ss near the beginning and end of the Kindergarten year. It was also administered to the Nursery-II Ss at the end of their Nursery year and again at the end of their Kindergarten year. This instrument was designed to tap general information and knowledge, concentrating on "specific achievements representing what the child brought with him to the educational experience rather than on broad areas of cognitive functioning" (Caldwell, 1965-66, p. 3). The items relate to basic information and vocabulary; number concepts and ordination; concepts of size, shape, motion and color; concepts of time, object class and social function; visual-motor performance; following instructions; and independence and self-help. The split-half reliability of the instrument (1965 revision) is $r = +.97$. The authors suggest that the test length (161 items) could be reduced and a subsequent edition of 85 items was developed which correlates highly with the original ($r = +.98$). The Yale-New Haven Prekindergarten research group eliminated twenty-two more items which were repetitive and the instrument employed in the follow-up research was composed of 63 items.

(A later revision by the Yale group is composed of 56 items.)

3) School Marks: The marks assigned to each child at the end of the school year by his teacher and recorded in his permanent record were used as measures of the child's adjustment to the classroom situation and his academic achievement. At the end of both Kindergarten and Grade I, five areas of personal-social behavior are assessed and given a mark ranging from A (Excellent) to F (Failing). The areas are: Cooperation, Industry, Initiative, Dependability and Social Control.

At the end of Grade I, marks are also given in several academic subjects. Since all subjects were not marked in all schools, the marks for reading and arithmetic were used in the present study to assess academic achievement in first grade. All marks were converted into numerical indices for purposes of statistical analysis.

4) Metropolitan Readiness Test: Form A of the Metropolitan Readiness Tests (1965 edition) was administered to the Nursery and NonNursery groups. The Ss had been in Grade I for approximately two months at the time of testing. The Metropolitan was administered to small groups ranging in number from 7 to 15 by psychologists in the Yale research team. One to three research assistants acted as aides at each testing, the number depending on the number of children in the group. At the school in which the majority of the Ss were enrolled, the researchers administered the Metropolitan to the total first grade population.

The Metropolitan is a widely used educational test used to assess readiness for learning in first grade. It was designed to tap broader areas of functioning than the Preschool Inventory though, like the Inventory, the Metropolitan also measures information and knowledge attained by the child. The revised edition was standardized on a population of over 12,000 school children across the country from a distribution of families representing

the socio-economic pattern of the nation as a whole. The test is reported to have satisfactory reliability (split-half and alternate form test-retest correlations all above r = +.90) and it correlates quite highly with the Murphy-Durrell Reading Readiness Analysis Test (r = +.80) when the total scores of the two instruments are used to determine relative readiness rankings of pupils. The revised Metropolitan also correlates highly with the Pintner-Cunningham Primary Mental Ability Test (r = +.76). The predictive validity of the Metropolitan to learning achievement in first grade is suggested by reported correlations between Metropolitan scores (experimental edition) in October of first grade and scores on the Metropolitan Achievement Tests administered the following May -- correlations ranging between +.62 and +.67.

Since the test manual suggests that "the total score provides an adequate basis for classification and grouping of pupils" and, further, that "efforts to attach significance to the subtest scores of individual pupils are not encouraged" (Hildreth, et al., 1966, p. 9) the present results are analyzed using total scores only.

5) Draw-A-Man: An optional Draw-A-Man test at the end of the Metropolitan Readiness Test was administered to the Nursery and NonNursery Ss The Metropolitan Manual notes that this subtest is "an adaptation of one drawing from the Goodenough-Harris Drawing Test" (Ibid., p. 2) and, for the purposes of this research, the drawings were scored using the Harris system (Harris, 1963). This seemed preferable to the system suggested in the Metropolitan Manual since the latter offers only a rough five-category rating scale based on partly subjective criteria. We have regarded the DAM as a separate measure, just as it is treated in the Metropolitan Manual.

The drawings were scored by two scorers after a check on their inter-scorer consistency on 20 drawings showed their ratings to have almost 100%

agreement. Harris reports that intercorrelations among different scorers range from the low .80's to as high as .96, with values commonly exceeding .90. He also reports satisfactory test-retest reliability of the DAM over a short time interval, though correlations have been reported in the .60's and .70's when that interval is as long as three months.

The Goodenough-Harris Draw-A-Man measure is generally regarded as a measure of intellectual or conceptual maturity. The Metropolitan Manual states that it is "an index of general intellectual maturity" (op. cit., p. 2). Harris contends:

> "the nature and content of ..[children's].. drawings are dependent primarily upon intellectual development... With young children, the Goodenough test score is considerably associated with intellectual maturity as assessed by the Stanford-Binet or the WISC. As would be expected, MA scores correlate more highly than IQ scores. It is probable that the drawing test also measures other aspects of psychological development. The attempt to determine what particular components of mental maturity are measured has not been entirely successful, possibly because such components are not clearly differentiated in young children (Garrett, 1946). Goodenough's original assumption that the drawing task in part reflects the ability to form concepts is correct. From the evidence summarized in Table 7, and in the additional studies reported here, the Draw-A-Man Test is not more allied with performance than with verbal abilities" (p.99). Harris concludes from the available evidence that "one thing measured by the Draw-A-Man Test is children's ability to form abstract concepts; .... also, that at age five and in relation to ability to draw the figure of a man, children's handling of quantitative and spatial concepts may be relatively more important than the emerging components of verbal meaning and perceptual speed" op. cit., pp. 68 and 98).

The two studies cited by Harris which report correlations between the DAM and Stanford-Binet among Kindergarten and first grade children found correlations of +.45 (MA) and +.41 (IQ);and +.36 (IQ).These suggest that although there is some agreement between the two measures, they are not interchangeable measures of intellectual maturity.

6) Stanford-Binet: The Stanford-Binet Intelligence Test, Form L-M was administered in a test-retest sequence (Zigler and Butterfield, 1967) to the Ss in the Nursery and NonNursery groups in Grade 1 (mid-year) and to the 14 Ss in the Nursery-II group in Kindergarten (mid-year). Ss were tested first under the standard test conditions outlined by Terman and Merrill in the test manual (1960). After an interval of three weeks each S was retested under motivationally optimizing conditions using the procedures set forth by Zigler and Butterfield:

> "1. The Picture Vocabulary item was presented first in order to assure some degree of initial success.
>
> 2. The next items to be administered were determined by the child's performance on the Picture Vocabulary test. If the child completed fewer than ten Picture Vocabulary items, year level II-6 was given next; if he completed 14 or more items, year level IV was given next. This procedure maximized the number of successes the child had early in the testing experience.
>
> 3. Whenever a child missed two consecutive items, he was given an easier item from a previous age level before he was given the next item.
>
> 4. If a child did not respond to an item, he was gently encouraged to do so. Such encouragement was continued until either the child responded or the examiner felt that the child could or would not respond correctly and that further encouragement would be frustrating to him." (Ibid., pp. 6-7.)

The Stanford-Binet tests were administered by two certified psychological examiners and by the project director, a psychologist with extensive experience testing young children on the Binet. Each S had the same examiner for his standard and optimized administrations. The project director tested the nine Nursery and NonNursery Group Ss in grade I in the upper-lower class school: one of the psychological examiners tested the seven NonNursery Group Ss in grade I in the lower class school; the other psychological examiner

administered the tests to the remaining 38 Nursery and NonNursery Ss and to the 14 Ss in the Nursery-II Group.

Inspection of the Binet data indicates that there were no systematic examiner differences either in standard IQ scores obtained or in number of Ss gaining vs. not gaining on the optimized retest. (See Appendix 2).

III. RESULTS

1st Year Follow-up Study

The results of three Kindergarten measures are presented below. The first two measures assess the children's personal-social adjustment to class routines and activities and in social interaction with classmates and teachers in Kindergarten. The third set of data provides a measure of the level of information and knowledge with which the children entered Kindergarten and their achievements in this area during the Kindergarten year.

A. Personal-Social Adjustment in Kindergarten

1) Operation Headstart Behavior Inventory: The mean Fall, Spring and Fall-to-Spring change in OHBI scores of Nursery and NonNursery male and female subgroups are presented in Table 1.

Table 1

OHBI $\bar{M}$ Total and Difference Scores in Kindergarten

	Fall $\bar{M}$	Spring $\bar{M}$	$\bar{M}$ Difference	N	
Nursery Male	143.000	141.319	-1.682	22	
Nursery Female	148.533	147.733	- .800	15	37*
NonNursery Male	127.110	131.110	+ 4.000	9	
NonNursery Female	122.333	174.333	+52.000	3	12

* OHBI ratings were available on five Nursery Ss who were subsequently lost to the study and thus are included only on this one measure.

The correlation between Fall and Spring total OHBI scores is $r = +.418$ ($df = 36$, $p < .01$). The means in Table 1 suggest that the amount of change in adjustment score from Fall to Spring tends to be correlated with initial score, where a lower initial score is associated with greater improvement over the year. This is supported by a significant negative correlation between Fall OHBI score and Fall to Spring difference score ($r = -.404$, $df = 36$, $p < .02$). Overall, the Nursery group is superior to the NonNursery group at the beginning of Kindergarten in personal-social adjustment ($t = 2.657$, $df = 47$, $p < .02$, 2-tailed).

Analysis of the Fall to Spring differences in total OHBI scores indicates that the Nursery group does not change significantly ($t = < 1$), while the NonNursery group improves significantly ($t = 1.940$, $df = 11$, $p < .05$, 2-tailed). The NonNursery Fall to Spring change is significantly different from the Nursery change ($t = 2.498$, $df = 47$, $p < .02$, 2-tailed).

The significant difference between the Nursery and NonNursery Ss at the beginning of Kindergarten is no longer present at the end of the Kindergarten year. The teachers' ratings in the Spring indicate that, overall, the NonNursery children have caught up to the Nursery children at the end of Kindergarten in the personal-social characteristics measured on the OHBI.

A Sex x Season unweighted means Analysis of Variance showed no significant overall differences between males and females on the OHBI in the Fall, in the Spring, or in amount of change over the year. However, the means of the Nursery and NonNursery groups are presented separately for boys and girls in Table 1 to show the striking difference within the NonNursery group. These children have similar mean ratings at Kindergarten entrance, but while the nine NonNursery boys show a mean gain of 4.000 points, the three NonNursery girls show a mean gain of 52.000 points over the year. Unfortunately, the Ns of these subgroups are small.

No racial comparisons were carried out because of the small number of White Ss in the sample (5 Nursery Males; 2 Nursery Females; 1 NonNursery Male). Inspection of the scores of these Ss suggests that there is no consistent difference between Negro and White Ss within the four subgroups on the OHBI.

2) School Marks: Marks in five areas of personal-social behavior are given to children at the end of Kindergarten in the New Haven schools. These are Cooperation, Industry, Initiative, Dependability, and Social Control. Marks assigned may range from A (Excellent) to F (Failing).

We first analyzed the Kindergarten marks by converting them to a numerical scale ranging from 1 = F to 5 = A (omitting plusses and minuses) and calculating the mean of the five marks to derive a total "adjustment" mark for Kindergarten. Since the marks are retained in the school records it was possible to collect this data on the larger NonNursery group tested the following year. The Ns of the groups in these comparisons are: NonNursery, N = 23; Nursery, N = 30.

The mean adjustment marks of the four subgroups are:

Nursery Male, 3.83 N = 17	NonNursery Male, 3.38 N = 12
Nursery Female, 3.98 N = 13	NonNursery Female, 4.04 N = 11

A group x sex unweighted means analysis of variance indicated no significant difference between the Nursery and NonNursery groups. The results suggested that girls tend to achieve higher marks for adjustment than boys ($F_{1/49}$ = 3.979, .10> p > .05), but this sex effect did not reach statistical significance. The four subgroups fall into the same rank order on the adjustment marks as on the Spring OHBI teacher rating scale (with the smaller sample of NonNursery Ss) -- the NonNursery males again having the lowest scores

for adjustment in Kindergarten. These measures are not independent, of course, since they are both teacher ratings. A t test carried out on the difference between Nursery and NonNursery Male groups' mean marks approached significance ($t = 1.41$, $df = 27$, $p < .10$), suggesting that the boys who attended Nursery tend to be better adjusted even at the end of Kindergarten (as judged by their teachers) than the boys who did not attend Nursery. The NonNursery girls, on the other hand, are rated as high or higher than both Nursery girls and boys at the end of the year.

Since this overall adjustment mark may obscure group differences in specific areas of adjustment, group x sex analyses of variance were also carried out on the five marks separately. In these analyses, the marks were converted to a finer numerical scale ranging from 1 to 14, where 14 = A, 13 = A-, 12 = B+, and so on to 1 = F-. These results are presented in Table 2.

The Nursery group tends to be superior in Industry, and is significantly superior in Initiative. No differences were found between the Nursery and NonNursery groups in the three characteristics which reflect, to a greater extent, behavior in social interaction situations. The results also indicate that culturally deprived girls, overall, tend to be more cooperative, and show significantly greater initiative than deprived boys in Kindergarten. Since the superiority of young girls in adopting acceptable social behavior and in academic performance in school is so well documented as to be taken for granted, it should be noted that the boys in this study who had attended Nursery are rated by their teachers as equal to the girls in industry, initiative and dependability in Kindergarten.

The two indices of personal-social adjustment during Kindergarten are moderately and significantly related, as one would expect of measures which demand quite different categorical assessments by a rater of overlapping areas of personality and behavior. The correlations of OHBI Spring scores

Table 2

$\bar{M}$s and F Ratios for Kindergarten Marks

1. COOPERATION

N	Subgroup	$\bar{M}$
17	Nursery Male	10.294
13	Nursery Female	11.231
12	NonNursery Male	10.250
11	NonNursery Female	11.818

F-Ratio		p
Group	.151	n.s.
Sex	3.202	<.10
Interaction	.204	n.s.

2. INDUSTRY

N	Subgroup	$\bar{M}$
17	Nursery Male	11.177
12	Nursery Female	11.250
12	NonNursery Male	8.750
10	NonNursery Female	11.000

F-Ratio		p
Group	3.580	<.10
Sex	2.698	n.s.
Interaction	2.367	n.s.

3. INITIATIVE

N	Subgroup	$\bar{M}$
17	Nursery Male	9.421
13	Nursery Female	11.000
12	NonNursery Male	7.750
11	NonNursery Female	9.909

F-Ratio		p
Group	4.172	< .05
Sex	4.011	< .05
Interaction	.469	n.s.

4. DEPENDABILITY

N	Subgroup	$\bar{M}$
17	Nursery Male	10.471
13	Nursery Female	10.308
12	NonNursery Male	9.250
11	NonNursery Female	11.273

F-Ratio		p
Group	.030	n.s.
Sex	1.574	n.s.
Interaction	2.173	n.s.

5. SOCIAL CONTROL

N	Subgroup	$\bar{M}$
17	Nursery Male	10.647
13	Nursery Female	11.000
12	NonNursery Male	9.750
10	NonNursery Female	11.600

F-Ratio		p
Group	.041	n.s.
Sex	2.236	n.s.
Interaction	1.033	n.s.

with the five Spring marks range from r = +.477 to +.599 (all r's are significant at $p < .01$) (see Table 4).

B. Achievement in Kindergarten

Total scores on the Caldwell Preschool Inventory (Yale revision, 1965) administered at the beginning and end of the Kindergarten year to Nursery and NonNursery Ss, and at the end of Nursery and end of Kindergarten to the Nursery-II Ss, were analyzed to determine the level of information and knowledge with which the Ss entered school and their increments in informational achievements during the Kindergarten year.

Before presenting the results it should be noted that on this measure, especially, we are hampered by the small number of NonNursery children on whom both the Fall and Spring measures were obtained two years ago. These results must be viewed as tentative findings, pending the results of the extensive Kindergarten follow-up study which is now being conducted.

The Fall and Spring means and Fall to Spring mean gains of the three groups and the groups broken down by sex are presented in Table 3.

Nursery-NonNursery comparisons: A groups x times analysis of variance of the Nursery and NonNursery Fall and Spring scores indicated that the groups do not differ significantly, though the means of the Nursery group are somewhat higher. (Nursery and NonNursery groups do not differ significantly in the Fall ($t = 1.255$, $df = 36$, n.s.) nor in the Spring ($t = 1.619$, $df = 36$, n.s.).) Comparisons of the Nursery-II scores obtained at the end of Nursery school and the Nursery and NonNursery scores at the beginning of Kindergarten show no differences among the groups in initial Caldwell scores (all $t's < 1$).

Both Nursery and NonNursery groups gain significantly over the Kindergarten year. The Nursery group shows a mean gain of 8.0 points ($t_{1/27} = 6.124$, $p < .001$, 1-tailed). The NonNursery group shows a mean gain of 6.5 points

Table 3

Caldwell Preschool Inventory (Yale revision, 1965): Mean Total Scores and Mean Fall-to-Spring Gains of Nursery and NonNursery Groups and Sex Subgroups

		Fall M	Spring M	Mean Gain	N
Nursery	Total	33.75	41.75	8.00	28
	Boys	28.94	37.82	8.88	17
	Girls	41.18	47.82	6.64	11
NonNursery	Total	29.60	35.90	6.30	10
	Boys	27.29	31.00	3.71	7
	Girls	35.00	47.33	12.33	3
Nursery-II	Total	31.67*	47.80	16.11**	9
	Boys	27.50*	45.00	17.50**	4
	Girls	35.00*	50.00	15.00**	5

* Tests administered at end of Nursery rather than beginning of Kindergarten

** Interval between tests was four to five months longer than that of the Nursery and NonNursery groups.

($t_{1/9}$ = 3.881, $p < .005$, 1-tailed). These gains are not significantly different ($t < 1$). The Nursery and Nursery-II groups' combined mean gain was compared to that of the NonNursery group. Again, there was no significant difference ($t = 1.404$, df = 45, n.s.).

Sex comparisons: Because of the small number of girls in the NonNursery group, no sex comparisons were possible in this group, though the mean gain of the three NonNursery girls (12.33) contrasts sharply with the gain of the NonNursery boys (3.71). Sex differences were analyzed within the Nursery group. Nursery girls score significantly higher than Nursery boys on the Caldwell at the beginning of Kindergarten ($t = 2.531$, df = 26, $p < .01$, 1-tailed) and again at the end of Kindergarten ($t = 3.069$, df = 26, $p < .005$, 1-tailed). The Nursery boys and girls do not differ significantly in amount of gain over the year ($t < 1$), but both groups improve significantly (boys: $t = 4.362$, df = 16, $p < .001$, 1-tailed; girls: $t = 6.139$, df = 10, $p < .001$, 1-tailed).

Nursery and NonNursery boys do not differ in achievement scores at the beginning of Kindergarten ($t < 1$). The Nursery boys mean gain is 8.88 points; the NonNursery boys mean gain is 3.71 points. These gains are both significant (Nursery boys: $t = 4.362$, df = 16, $p < .001$, 1-tailed; NonNursery boys: $t = 2.520$, df = 6, $p < .05$, 1-tailed). At the end of Kindergarten, however, the Nursery boys score significantly higher on the Caldwell than the NonNursery boys ($t = 2.08$, df = 22, $p < .025$, 1-tailed).

These tentative, preliminary findings underline the possible importance of sex differences in assessing the effect of a nursery school experience on subsequent learning in school. The present findings corroborate the superiority of girls on achievement measures at this age. The tentative finding here which should be investigated further is that, though the culturally deprived boys who had a nursery experience enter Kindergarten with

about the same amount of information and general knowledge as the boys who did not have this experience, the Nursery boys learn significantly more in Kindergarten than the NonNursery boys. This finding parallels the differences between the two groups in their personal and social adjustment ratings at the end of Kindergarten. Such a pattern contrasts rather sharply with that of the culturally deprived girls in our sample who "caught up" to the Nursery girls during Kindergarten on both the adjustment and achievement measures.

C. Interrelationships among Kindergarten Measures

The test-retest correlation of the Caldwell (with an interval of approximately seven months) was $r = +.763$, $df = 36$, $p < .01$, 2-tailed. Gains are not significantly related to initial score on the Caldwell (Fall to Spring difference scores correlated with Fall scores, $r = -.263$, $df = 36$, n.s.).

Caldwell achievement scores correlate positively with goodness-of-adjustment as rated both at the beginning and end of Kindergarten on the OHBI (see Table 4). Thus, children who have superior conceptual knowledge and general information tend also to be rated as better adjusted by their teachers. A similar relationship may be seen between educational achievement at the end of Kindergarten and the personal-social characteristics marked by the teacher with the exception of Cooperation which is not related to achievement.

An overall correlation (Nursery and NonNursery combined) of OHBI change scores and Caldwell difference scores shows no relationship between these two change-over-Kindergarten Measures ($r = +.006$). This is not surprising in view of the superior adjustment exhibited by the Nursery children even at school entrance. The correlation for Nursery Ss only is not significant ($r = +.231$, $df = 25$, n.s.). Among the eight NonNursery Ss, on the other hand, the amount of change in OHBI adjustment is highly related to the amount of gain on the Caldwell during Kindergarten ($r = +.858$, $p < .01$).

Table 4

Intercorrelations among Kindergarten Measures

	Caldw. Fall	Caldw. Spring	OHBI Fall	OHBI Spring	Overall $\bar{M}$ Adj. Mark	Coop. Mark	Indust. Mark	Init. Mark	Depend. Mark	Social Control Mark
Caldwell Fall	1.000 (37)	.763** (37)	.495** (35)	.512** (35)	.404* (37)	.178 (37)	.470** (37)	.539** (37)	.219 (37)	.186 (37)
Caldwell Spring		1.000 (37)	.497** (35)	.517** (35)	.487** (37)	.196 (37)	.479** (37)	.556** (37)	.365* (37)	.337* (37)
OHBI Fall			1.000 (38)	.418** (38)	.472** (38)	.323* (38)	.414* (38)	.319 (38)	.353* (38)	.512** (38)
OHBI Spring				1.000 (38)	.653** (38)	.509** (38)	.492** (38)	.599** (38)	.565** (38)	.477** (38)
Overall $\bar{M}$ Adjustment Mark					1.000 (53)	.841** (53)	.877** (51)	.750** (53)	.909** (53)	.831** (52)
Cooperation Mark						1.000 (53)	.604** (51)	.378** (53)	.803** (53)	.815** (52)
Industry Mark							1.000 (51)	.809** (51)	.699** (51)	.547** (50)
Initiative Mark								1.000 (53)	.533** (53)	.354** (52)
Dependability Mark									1.000 (53)	.811** (52)
Social Control Mark										1.000 (52)

* $p = < .05$
** $p = < .01$

2nd Year Follow-up Study

The follow-up investigation was continued during 1966-67 to study the comparative progress of the Nursery and NonNursery Ss in their second year of public school. Most were enrolled in Grade 1, though 12 of the 53 Ss were placed in a "Reading Readiness First Grade" indicating that, in the teachers' judgment, these children were not yet ready for first grade work.

Table 5

Enrollment of Ss in Grade 1
or Reading Readiness Class

	Grade 1		Reading Readiness	
	Nursery Group	NonNursery Group	Nursery Group	NonNursery Grou
Males	13	7	4	5
Females	12	9	1	2
Total	25	16	5	7

The breakdown of Ss by class assignment is presented in Table 5. Since Reading Readiness classes do not receive marks in academic subjects, the 12 R.R. Ss are not included in those results. They are included, however, in the other second year measures.

Before presenting the results of the second year study, note should be made of a change in the composition of the subgroups which resulted from the loss of Ss in the upper-lower class school. In that school, three of the eight Nursery female Ss and all three Nursery male Ss were lost through

moving or enrollment in a nearby parochial school. In the second year study, therefore, there are five upper-lower class Nursery girls in the sample of 13 (38%). Among the NonNursery Ss, four of the 11 girls are in the upper-lower class school (36%). There are no upper-lower class boys in either group. While the two female groups are thus comparable in socio-economic level, and the two male groups are comparable, the overall female group would seem to be favored over the overall male group. This factor would not affect the results of group comparisons (Nursery vs. NonNursery) but it could contaminate sex comparisons (Female vs. Male). A recheck of fathers' occupations revealed no differences between the male and female groups on this criterion, but the type and quality of housing in the several school districts clearly reflects the socio-economic difference cited previously.

In order to determine whether the socio-economic difference within each female group was associated with any systematic bias, the means of the upper-lower and lower-lower class female Ss in the Nursery and NonNursery groups were computed separately on the 2nd year measures. Since no systematic difference between the upper-lower and lower-lower class female Ss was even suggested (see Appendix 3), there seems to be ample justification for presenting the results without further consideration of the socio-economic issue.

A. Personal-Social Adjustment in Grade 1

An index of overall adjustment in Grade 1 was again derived from the end-of-year marks on five personal-social characteristics. The resulting subgroup means are:

	M	N
Nursery Males	3.61	17
Nursery Females	3.97	13
NonNursery Males	3.20	12
NonNursery Females	4.03	11

A group x sex analysis of variance indicates that, overall, females have significantly higher marks for first grade adjustment than males ($F_{1/49}$ = 9.327, $p < .01$). Neither the group nor interaction effects was significant. This result is similar to that obtained in Kindergarten, though the sex difference did not quite reach statistical significance in the earlier comparison. Again, as in Kindergarten, the difference between the Nursery and NonNursery male groups' means approached significance ($t = 1.35$, $df = 27$, $p < .10$) with Nursery boys rated as superior to NonNursery boys in these personal-social characteristics.

With all Ss combined, Kindergarten and Grade 1 mean adjustment marks correlate $r = +.621$, $df = 52$, $p < .01$.

Unweighted means analyses of variance were again computed for each of the five marks separately. These results are summarized in Table 6. In Grade 1, girls are superior to boys in all five areas of personal-social adjustment in school. This overall sex difference was not evident in Kindergarten, when female superiority was found only in Cooperation and Initiative.

While the Nursery group was judged superior to the NonNursery group in Kindergarten in Industry and Initiative, this group trend is maintained in Grade 1 only in Industry (F ratios at both years approach significance). The change among the groups in Initiative seems to be due to the improvement of the NonNursery girls (the three other subgroup means drop slightly).

Intercorrelations among Kindergarten and Grade 1 adjustment marks may be found in Appendix 4.

B. Readiness for Academic Work in Grade 1

Metropolitan Readiness Test: Mean total scores and standard deviations, percentile ranks and letter ratings on the Metropolitan Readiness Test, Form A (1965 revision) of Nursery and NonNursery groups, broken down by sex, are presented in Table 7.

Table 6

$\bar{M}$s and F-Ratios for Grade 1 Marks

1. COOPERATION

N	Subgroup	$\bar{M}$
17	Nursery Male	9.941
13	Nursery Female	11.692
12	NonNursery Male	10.083
11	NonNursery Female	12.636

F-Ratio		p
Group	.867	n.s.
Sex	13.609	< .01
Interaction	.472	n.s.

2. INDUSTRY

N	Subgroup	$\bar{M}$
17	Nursery Male	10.588
13	Nursery Female	11.231
12	NonNursery Male	8.583
10	NonNursery Female	10.700

F-Ratio		p
Group	3.086	< .10
Sex	3.654	< .10
Interaction	1.043	n.s.

3. INITIATIVE

N	Subgroup	$\bar{M}$
17	Nursery Male	9.529
13	Nursery Female	10.692
12	NonNursery Male	7.583
11	NonNursery Female	10.455

F-Ratio		p
Group	2.200	n.s.
Sex	7.508	< .01
Interaction	1.346	n.s.

4. DEPENDABILITY

N	Subgroup	$\bar{M}$
17	Nursery Male	9.529
13	Nursery Female	10.539
12	NonNursery Male	8.500
11	NonNursery Female	10.909

F-Ratio		p
Group	.200	n.s.
Sex	5.379	< .05
Interaction	.902	n.s.

5. SOCIAL CONTROL

N	Subgroup	$\bar{M}$
17	Nursery Male	9.294
13	Nursery Female	10.385
12	NonNursery Male	8.500
11	NonNursery Female	10.909

F-Ratio		p
Group	.032	n.s.
Sex	5.461	< .05
Interaction	.775	n.s.

Table 7

Metropolitan Readiness Test, Form A, 1965 Revision.
Mean, S.D., Percentile Rank and Letter Ratings
of Four Subgroups After Two Months in Grade 1.

	N	S.D.	Mean	%ile Rank	Letter Rating
Nursery Males	17	15.92	45.41	32	C
Nursery Females	13	6.05	51.92	44	C
NonNursery Males	12	13.78	38.08	20	D
NonNursery Females	11	19.16	47.91	36	C

These data were analysed using a group x sex unweighted means analysis of variance. The results indicated that, overall, females had significantly higher readiness scores than males ($F_{1/49} = 4.111$, $p < .05$). There was no significant Group effect ($F = 1.982$) or Interaction ($F < 1$).

Applying the procedure for testing homogeneity of variance given in Winer (1962, p. 34), the Nursery Female group is shown to have significantly less variability than either the Nursery Male group ($F = 2.62$, $p < .05$) or the NonNursery Female group ($F = 2.75$, $p < .05$). The Nursery Female mean total score on the Metropolitan approaches the national mean of 53.3 (based on a standardization population of 12,225) (Test Dept., Harcourt, Brace & World, Inc., circa 1966).

The standard deviation of the national norm group is approximately 16 to 17 points (Ibid.; Hildreth et al., p. 14). The homogeneity in the Nursery Female subgroup here on the Metropolitan Test is rather puzzling, since this trend is not apparent on the other follow-up measures.

The overall superiority of girls on the Metropolitan in Grade 1 parallels the findings on the Caldwell Preschool Inventory the year before. Combining all Ss, scores on the Caldwell at the beginning of Kindergarten correlate with Grade 1 Metropolitan scores, $r = +.577$, $df = 34$, $p < .01$). The correlation of the end-of-Kindergarten Caldwell scores and the Metropolitan scores is substantially higher ($r = +.713$, $df = 34$, $p < .01$).

C. Academic Achievement

The mean marks of the Nursery and NonNursery groups, broken down by sex, for achievement in Reading and Arithmetic in Grade 1, are presented below. Ss in Reading Readiness classes are omitted.

Table 8

Reading and Arithmetic Marks:

Means of Four Subgroups

	Subgroup N	Mean Reading Mark	Mean Arithmetic Mark
Nursery Males	13	3.46	3.62
Nursery Females	12	3.42	3.50
NonNursery Males	7	2.64	3.14
NonNursery Females	9	3.89	3.78

A group x sex unweighted means analysis of variance of the Reading marks yielded Sex and Interaction effects which approached significance (Sex: $F_{1/37} = 3.272$, $.10 > p > .05$; Interaction: $F_{1/37} = 3.779$, $.10 > p > .05$). Overall, girls tend to achieve higher marks in Reading than boys. The group x sex interaction effect reflects the polarization of the NonNursery group

on this measure, with the NonNursery girls receiving the highest Reading marks while the NonNursery boys receive the lowest Reading marks. Nursery males and females do not differ in their reading achievement in Grade 1, nor do the two female groups ($t = .53$ n.s.). The NonNursery male group, however, has a significantly lower mean Reading mark than either the Nursery male group ($t = 5.68$, $df = 18$, $p < .005$, 1-tailed) or the NonNursery female group ($t = 2.45$, $df = 14$, $p < .025$, 1-tailed).

A similar analysis of variance was calculated on the Arithmetic marks. Neither group, sex nor interaction effects were found and inspection of the mean Arithmetic marks of the four subgroups in Table 8 shows them to be quite similar.

The best predictor of reading achievement in this study is the Metropolitan Readiness Test score. The correlation of the Metropolitan (beginning of Grade 1) and Reading marks achieved at the end of Grade 1 is $r = +.641$, $df = 39$, $p. < .01$). Although the Caldwell Preschool Inventory scores at the beginning of Kindergarten do not correlate significantly with Grade 1 reading marks ($r = +.235$, $df = 30$, n.s.), Caldwell scores at the end of Kindergarten correlate with Grade 1 Reading marks, $r = +.531$, $df = 30$, $p < .01$). Improvement on the Caldwell from beginning to end of Kindergarten also correlates significantly with reading achievement the following year ($r = +.408$, $df = 30$, $p < .02$) as does the OHBI rating of personal-social adjustment at the end of Kindergarten ($r = +.464$, $df = 30$, $p < .01$).

The Grade 1 Reading, Arithmetic and personal-social marks are all highly intercorrelated (see Table 11).

D. Measures of Intelligence

1) Draw-A-Man Test: Mean standard scores on the Draw-A-Man measure of intellectual maturity are presented in Table 9:

Table 9

Draw-A-Man Test: Mean Standard Scores

	N	Mean Standard Score
NURSERY	32	94.375
Males	19	94.368
Females	13	94.385
NONNURSERY	23	84.000
Males	12	81.667
Females	11	86.545

Analyses of the DAM scores indicate that the Nursery Ss score significantly higher than the NonNursery Ss ($t = 2.563$, $df = 53$, $p < .025$, 1-tailed). There is no overall sex difference nor are there significant sex differences within either group. While the difference between the Nursery and NonNursery female groups is not significant, the Nursery males have significantly higher scores on the DAM than the NonNursery males ($t = 2.480$, $df = 29$, $p < .01$, 1-tailed).

2) Stanford-Binet Intelligence Test: The Stanford-Binet Intelligence Test, Form L-M was administered twice in Grade 1 (mid-year) to the Nursery and NonNursery Ss and in Kindergarten (mid-year) to Nursery-II Ss. The first test was administered under standard conditions; the second test was administered to all Ss after a three-week interval under motivationally optimizing conditions. The mean IQ scores of the three groups and six sex subgroups at Test 1 (Standard Condition) and Test 2 (Optimizing Condition) and the mean difference from Test 1 to Test 2 (S-O) are shown in Table 10.

Table 10

Stanford-Binet Intelligence Test:

Mean IQs and IQ-difference scores

	N	Test 1-S	Test 2-O	S-O Mean Difference
Nursery Total	31	93.87	94.65	+.77
Males	18	90.94	90.83	-.11
Females	13	97.92	99.92	+2.00
NonNursery Total	23	87.26	88.48	+1.22
Males	12	81.58	84.00	+2.42
Females	11	93.45	93.36	-.09
Nursery-II Total	14	91.00	93.93	+2.93
Males	9	86.77	89.89	+3.11
Females	5	98.60	101.20	+2.60

A 2 x 2 x 2 (Group x Sex x Condition) unweighted means analysis of variance was carried out on the Binet IQ scores of the two Grade 1 groups (Nursery and NonNursery). Only sex is a significant variable($F_{1/52} = 8.639$, $p < .01$) with girls performing better on the Binet, regardless of prior Nursery experience or test condition. Although the mean IQ of the Nursery group is higher than that of the NonNursery group, this difference is not significant ($p > .10$). A similar analysis was performed on the Binet data with the Nursery-II (Kindergarten) data included. Once again, sex is a significant variable ($F_{1/64} = 6.997$, $p < .05$) with females having higher IQ scores regardless of Nursery experience or test condition. However, in this analysis Condition was also significant ($F_{1/64} = 4.962$, $p < .05$) indicating that, when the younger Nursery-II data is included, scores obtained under

motivationally optimizing conditions are significantly superior to those obtained under standard conditions. Since this finding resulted from the inclusion of Nursery-II group data, a dependent t test was computed on the difference scores between Test 1 (Standard Condition) and Test 2 (Optimizing Condition) of these 14 Ss. The result indicates that, among Nursery Ss attending Kindergarten, Binet IQ scores obtained at Test 2 are significantly higher than those obtained at Test 1 ($t_{1/13} = 2.358$, $p < .05$, 2-tailed).

These results on the Binet suggest that the Nursery Ss tend to perform better on an intelligence test than NonNursery Ss though the difference is not statistically significant. Retesting under motivationally optimizing conditions does not appear to improve test performance of culturally deprived children of public school age as much as it did among children of nursery school age. Though the younger Nursery-II group does show significant improvement from the Standard to Optimizing tests, the mean change is less than three IQ points.

Referring once again to the results of the two major comparison groups (Nursery and NonNursery, Grade 1), the test-retest correlation on the Binet is $r = +.938$, $df = 52$, $p < .01$). The Binet IQ scores correlate substantially with the Metropolitan Readiness test scores ($r = +.690$; $df = 50$, $p < .01$) and the Caldwell Preschool Inventory scores at the end of Kindergarten ($r = +.720$, $N = 37$). Correlations with Draw-A-Man standard scores are somewhat lower ($r = +.525$).

Binet correlations with school marks are: Mean Adjustment Mark in Kindergarten, $r = +.475$, $N = 53$; Mean Adjustment Mark in Grade 1, $r = +.446$, $N = 53$; Reading Mark, $r = +.524$, $N = 41$; Arithmetic Mark, $r = +.367$, $N = 41$.

Among the 22 Nursery Ss on whom data is available, the Binet IQs (Standard Condition) in Grade 1 and the Binet IQs (Standard Condition) obtained two years before (Spring of Nursery school) correlate $r = +.553$.

The Binet IQ scores obtained under optimizing (retest) conditions correlate more highly with all measures of intelligence, achievement and personal behavioral characteristics than do the standard Binet IQ scores.

Table 11

Intercorrelations among Grade 1 Measures

* p = <.05
** p = <.01

	Metrop.	DAM	Stanford Binet-S	Stanford Binet-O	Overall $\bar{M}$ Adjustm. Mark	Reading Mark	Arithm. Mark	Coop. Mark	Industry Mark	Initi. Mark	Depend. Mark	Social Contr. Mark
Metropolitan	1.000 (52)	.594** (52)	.690** (52)	.756** (52)	.532** (52)	.641** (41)	.508** (41)	.279* (52)	.552** (51)	.555** (52)	.445** (52)	.441** (52)
DAM		1.000 (52)	.525** (52)	.541** (52)	.388** (52)	.480** (41)	.437** (41)	.172 (52)	.435** (51)	.335* (52)	.332* (52)	.301* (52)
Stanford-Binet-S			1.000 (53)	.938** (53)	.446** (53)	.524** (41)	.367* (41)	.292* (53)	.420** (52)	.410** (53)	.375** (53)	.377** (53)
Stanford-Binet-O				1.000 (53)	.453** (53)	.563** (41)	.439** (41)	.292* (53)	.416** (52)	.446** (53)	.385** (53)	.391** (53)
Overall $\bar{M}$ Adjustment Mark					1.000 (53)	.710** (41)	.668** (41)	.752** (53)	.878** (52)	.807** (53)	.921** (53)	.898** (53)
Reading Mark						1.000 (41)	.835** (41)	.356* (41)	.696** (41)	.745** (41)	.568** (41)	.521** (41)
Arithmetic Mark							1.000 (41)	.277 (41)	.655** (41)	.729** (41)	.544** (41	.504** (41)
Cooperation Mark								1.000 (53)	.526** (52)	.423** (53)	.687** (53)	.658** (53)
Industry Mark									1.000 (52)	.815** (52)	.717** (52)	.688** (52)
Initiative Mark										1.000 (53)	.620** (53)	.563** (53)
Dependability Mark											1.000 (53)	.927** (53)
Social Control Mark												1.000 (53)

IV. SUMMARY AND DISCUSSION

This study of culturally deprived children in Kindergarten and Grade 1 was designed to investigate whether or not an extensive preschool nursery experience affects subsequent personal and academic development in public school. The group of children who are the main focus of the study attended a Headstart-type Prekindergarten in New Haven, Connecticut for a nine-month period in 1964-65. During the two years in which they were followed-up a number of related studies were published. The DARCEE group in Nashville, under the direction of Susan Gray, published follow-up findings (Gray and Klaus, 1966) on culturally deprived children who were enrolled in their preschool program. In the DARCEE project, children attended nursery school for two or three summers prior to public school entrance, and this program was supplemented during the winter with weekly home visits by DARCEE teaching staff. The other studies (Wolff and Stein (1966) in New York, Waller and Connors (1966) in Baltimore, and Hess et al. (1966) in Chicago) were carried out with children who had attended Headstart nurseries for just two months. The nursery experiences of the Ss in these follow-up studies and in the present New Haven study were thus quite different and this factor will be referred to in subsequent discussions of comparative findings.

School Adjustment: Personal Characteristics and Social Behavior

The findings on the OHBI measures in the present study indicate that culturally deprived children who have had a nursery school experience adjust better to the work, routines and social demands of Kindergarten than do children who have not had a prior school experience. By the end of the Kindergarten year there is no overall difference between the two groups, the

NonNursery children showing significant improvement over the school year. Although the N of the NonNursery group is small on this measure, a sex breakdown revealed that virtually all the improvement in the NonNursery group stemmed from the very great gains of the three NonNursery girls in that sample. Almost no improvement was shown by the nine NonNursery boys in personal-social behavior.

School marks in areas of personal-social behavior were available for a larger number of NonNursery children (N = 23). These end-of-Kindergarten marks were consistent with the ratings of the teachers on the OHBI at the end of Kindergarten. Nursery and NonNursery groups did not differ as a whole, but Nursery boys tended to have higher marks than NonNursery boys. When the five marks were analyzed separately, the Nursery children were significantly superior in Initiative and they tended to be superior in Industry. The overall superiority of girls was evinced most clearly in the area of Cooperation.

The finding that Nursery children adjust better initially to Kindergarten than NonNursery children is consistent with results reported by Wolff and Stein (1966) and Hess (1966) in their follow-up studies of Headstart programs. Wolff reports that NonHeadstart children caught up to Headstart children by November of Kindergarten, but no sex breakdowns were given. Hess, by the way, in reporting significant differences between Headstart and NonHeadstart children in teachers' ratings of motivation to achieve, independence, verbal participation and lack of timidity, expresses some reservation about the objective validity of his findings because of the possibility that the teachers' knowledge of which children attended Headstart introduced some bias into the ratings. This factor probably does not enter into the New Haven findings since, as far as could be determined, the Kindergarten teachers at that time did not have precise information as to which children had been enrolled in the PreKindergartens.

Research to date, including the present follow-up study, clearly indicates that a nursery school experience -- even of short duration -- helps the culturally deprived child to adjust more easily and quickly to the Kindergarten program. While Wolff's data suggests that this advantage is soon lost, the findings of the present study suggest that the effects of a (longer) nursery experience have more than a short-term benefit, particularly for culturally deprived boys. The group of boys who had had nine months of nursery maintained their high level of adjustment throughout Kindergarten while the NonNursery boys remained at a much lower level. The NonNursery girls, on the other hand, did catch up (and even tend to surpass) both boys and girls who had attended nursery.

Although both boys groups' overall adjustment marks drop in Grade 1, while the girls' do not, the Nursery boys still tend to be better adjusted than the NonNursery boys. Nursery children, overall, continue to be rated as significantly more industrious than NonNursery children in Grade 1.

Academic Achievement

The poor academic performance of culturally deprived children and their progressive lag in achievement as they move on into the higher grades was the major impetus to the establishment of early educational intervention programs. The consequences of nursery school on subsequent learning is thus regarded as the major focus of follow-up investigations.

In the present study a number of different measures of learning or school achievement were utilized. The Caldwell Preschool Inventory, used by Hess and Wolff in slightly longer revisions, was the measure used to indicate levels of general information and conceptual knowledge at the beginning and at the end of Kindergarten. The Metropolitan Readiness Test, administered early in Grade 1, provided a relative index of learning achievements, though

performance on this test is also determined in part by developmental variables such as perceptual-motor maturity and by intellectual ability.* Marks in Reading and Arithmetic obtained by the children at the end of Grade 1 provided a measure of classroom achievement.

The Headstart studies generally have not found superior achievement as a consequence of that two-month nursery experience. Hess (op. cit.) finds no significant differences between Headstart and NonHeadstart groups on the Caldwell Inventory either at the beginning or end of Kindergarten. Wolff (op. cit.) finds no differences between similar groups on the Caldwell when it is administered mid-way through the Kindergarten year. Hess also finds no significant differences between Headstart and NonHeadstart groups at the end of Kindergarten on an academic readiness test. In the DARCEE follow-up (Gray and Klaus, op. cit.) of children who had had a longer nursery program, the Nursery groups tend to be superior to the NonNursery groups (differences approach statistical significance) on the Metropolitan Achievement Test in the first year of public school and on the Stanford Achievement Test in the second year of public school.

In our New Haven follow-up of the nine-month nursery program, no overall differences were found on the Caldwell at the beginning or end of Kindergarten. This finding is consistentwith the Headstart reports. However, in the present study the overall comparability of the two groups is again the product of the large mean gains of the NonNursery girls. Comparisons of the Nursery and NonNursery boys show that, though the two groups enter Kindergarten at the same level on the Caldwell, the performance of the boys who had attended nursery school is significantly superior by the end of Kindergarten.

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*The publishers of the Metropolitan tests, in differentiating intelligence and readiness tests, say that readiness tests contain more learned material and "generally reflect a child's experiences to a greater degree than do the usual early-grade intelligence tests"(Test Department, 1966).

(This achievement differential parallels the findings on personal-social adjustment at the end of Kindergarten.)

The differential change-over-time in learning exhibited by the boys is what would be predicted from the Zigler and Butterfield (1967) results. They found that the nursery experience effects changes in motivational factors which then facilitate the children's intellectual performance. Nursery did not broaden the children's knowledge or fund of information. Thus, differences on an achievement measure would not be expected at the beginning of Kindergarten. They would be expected later, as a consequence of the alleviation of factors detrimental to learning. It should be remembered, however, that the N of the NonNursery group is small on the Caldwell measures, so this finding must be regarded as tentative, pending further empirical support.

The Metropolitan results (with a larger NonNursery group), like the Caldwell results, show no overall differences between Nursery and NonNursery children near the beginning of Grade 1. Examination of the means of the sex subgroups shows that the NonNursery boys have the poorest scores of the four subgroups and that the Nursery boys do just about as well as the NonNursery girls on this test.

Reading marks achieved by the Nursery and NonNursery Ss who were judged ready for first grade work show most clearly the group-sex interaction effects suggested in the foregoing findings on achievement. While girls in general tend to have higher marks than boys, the Nursery boys' mean Reading mark is even slightly higher than the Nursery girls. It is the NonNursery boys group which once more lags behind in school achievement, having a significantly lower average mark (D+ or C-) than either the Nursery boys or the girls (C+ to B-).

Arithmetic marks do not differentiate among the groups. The average marks are similar to those obtained for Reading with the exception of the NonNursery

boys' mean mark, which is substantially higher than their Reading mark. (This change might be interpreted as stemming from verbal factors, but the evidence from the Draw-A-Man Test (a non-verbal measure) would not support any kind of general inference of this sort.)

Intellectual Performance

In Grade 1 the children who attended a PreKindergarten nursery tend to perform better on measures of intelligence than do NonNursery children. This superiority is most evident on the Draw-A-Man Test which purportedly taps intellectual or conceptual maturity. On the Stanford-Binet, a broader measure of intelligence, the Nursery children also tend to perform better though the difference is not clear-cut.*

Waller & Connors (1966), following up the Ss in the Baltimore Headstart study (Eisenberg and Connors, 1966) found significantly higher scores associated with Headstart experience on the Peabody Picture Vocabulary Test mid-way through Kindergarten. They did not find any differences between Headstart and Control groups on the Draw-A-Man measure at this time, however. The overall intelligence test results in the present study are similar to those found by the DARCEE group; namely, that two years after a longer nursery experience there is still a tendency for Nursery children to perform better than NonNursery children.

The test-retest Binet results of the New Haven study suggest that optimizing is not as generally effective a procedure for improving performance on the Stanford-Binet as it had been with younger children in the Zigler-Butterfield study. When the results of the Nursery-II group (tested in Kindergarten)

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* It is noteworthy that the 18 girls in this study who had had a nursery experience obtained IQs which are comparable to the average of the overall national population. Among these deprived girls -- virtually all of whom are Negro -- there is no indication in Grade 1 of any general deficit in intellectual performance.

were included in the present analyses, the retest (Optimizing Condition) IQ scores were significantly higher than the IQs obtained under standard test conditions, but the mean IQ difference was less than three points for all groups. The IQs obtained under Optimizing conditions do correlate better with all other performance measures in this study and this suggests that they provide a better indication of the child's potential for actual achievement than do the IQ scores obtained under standard test conditions.

In conclusion, the findings of this follow-up study of the nine-month PreKindergarten program for culturally deprived, urban children in New Haven -- though these must be regarded as tentative results pending the completion of the larger study now in progress -- suggest that the kinds of experience provided by this educational program do have beneficial consequences on the intellectual and personal development of the children during their first years in public school. Scope of nursery program seems to be an important factor in determining whether these effects will occur, for the New Haven and the Nashville studies following-up children who had had programs of nine months or more find evidence of such benefits, while the follow-up studies of the short, two month Headstart programs do not find such effects except in the initial adjustment of the children to Kindergarten.

The present study raises some interesting educational issues with respect to sex differences among ghetto children. The findings give clear evidence of the superiority of young girls over boys in performance and behavior in this population, just as is typically found among middle-class children. However, the present results suggest that culturally deprived boys who have had a nursery experience of some length can and do learn and perform in school about as well as the girls, at least in Kindergarten and Grade 1. These tentative findings also show that girls who have not had nursery experience start school with the same disadvantage in personal-social adjustment

as the boys who have not had nursery school, but they catch up to the Nursery children by the end of Kindergarten (in achievement as well as adjustment) while the NonNursery boys do not.

The possibility exists that the rather small NonNursery boys group in this study is not typical. It is also possible that the superiority of the Nursery boys stems from unknown selective factors operating in such a way that culturally deprived boys who are enrolled in nursery represent a superior group whereas the same is not true of culturally deprived girls. While these reservations cannot be ruled out, the equivalent performance of the NonNursery boys on the Caldwell at Kindergarten entrance argues against the second possibility and, too, it is difficult to conceptualize what variables could be operating to produce a nursery-recruitment sex-differential of the kind depicted.

A current view holds that family structure in urban ghettoes may be more unfavorable for the development of boys than for girls. The implication of the present findings -- that the long-term impact of an intervention program may be greater for deprived boys than for girls -- is pertinent to this issue and deserves further investigation.*

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* An interesting footnote to the question of whether there are sex differences in the effects of a nursery experience is our finding in a prior study of these children while they were attending nursery school that the boys change significantly during the year in play pattern (from solitary towards greater interactive play) and in amount of class verbalization; while the girls show no changes in classroom behaviors. (Time-sampling observation measures in late Fall, late Winter and Spring)

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Appendix 1

Sex, Race and School Composition of Subject Groups

	SEX		RACE		SCHOOL			
					Lower socio-economic Schools			Upper-lower socio-economic School
			White	Negro	# 1	# 2	other	
NURSERY	Males	18	4	14	18			
	Females	13	4	9	8			5
		31	8	23	26			5
NONNURSERY	Males	12	2	10	8	4		
	Females	11	1	10	4	3		4
		23	3	20	12	7		4
NURSERY-II	Males	9	2	7	4		5	
	Females	5	1	4	3		2	
		14	3	11	7		7	

Appendix 2

Number of Ss Gaining vs. Not Gaining under Optimizing Condition Retest With Three Examiners

Test Examiner	Number of Ss Gaining under Optimizing Conditions	Number of Ss Not Gaining under Optimizing Condition
# 1	23	15
# 2	4	4
# 3	4	4
	31	23

Appendix 3

$\bar{M}$ Score of Female Ss by Group and Socio-Economic Class Level on Grade 1 Measures

Group/Socio Economic Status		Metropolitan	DAM	Binet (S)	Binet (O)	Overall Adj. Marks	Reading Mark	Arithm. Mark
Nursery Lower-Lower	$\bar{M}$	51.6	94.8	98.9	99.8	4.1	3.3	3.6
	N	(8)	(8)	(8)	(8)	(8)	(8)	(8)
Nursery Upper-Lower	$\bar{M}$	52.4	93.8	96.4	100.2	3.8	3.6	3.4
	N	(5)	(5)	(5)	(5)	(5)	(5)	(5)
NonNursery Lower-Lower	$\bar{M}$	47.7	88.9	91.4	92.7	4.1	4.2	4.2
	N	(7)	(7)	(7)	(7)	(7)	(7)	(7)
NonNursery Upper-Lower	$\bar{M}$	48.3	82.5	97.0	94.5	4.0	3.5	3.5
	N	(4)	(4)	(4)	(4)	(4)	(4)	(4)

Appendix 4

Intercorrelations Among Kindergarten and Grade 1 Marks on Personal-Social Characteristics

		KINDERGARTEN MARKS				
		Cooperation	Industry	Initiative	Dependability	Social Contr
GRADE I MARKS	Cooperation	+.639**	+.457**	+.379**	+.628**	+.485**
	Industry	+.285*	+.570**	+.519**	+.472**	+.357**
	Initiative	+.184	+.492**	+.587**	+.327*	+.255
	Dependability	+.441**	+.429**	+.336*	+.618**	+.620**
	Social Control	+.448**	+.399**	+.293*	+.575**	+.598**

N = 51 - 53
* = $p < .05$
** = $p < .01$